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Impact of Wage Rate and Employment Days on Labour Productivity in Dairy Industry in India: An Empirical Analysis

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Authors' contributions

This work was carried out in collaboration between both authors. Both authors read and approved the final manuscript.

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ABSTRACT

India is the largest consumer as well as producer of milk in the world which holds nearly 25 per cent share in overall world's milk producers. The dairy industry in India creates huge employment opportunities whether direct or indirect engaging family members in rural areas. There is a growth of 6.6% in dairy industry over last decade. One of the most important factors which are responsible for growth in dairy industry, particularly in rural areas is labour productivity. Previous studies indicated that labour productivity is much higher in Indian Dairy industry than in the agriculture sector in India. Thus, there is a need to examine the growth of labour productivity in Indian dairy industry and its possible determinant factors. Hence, the present study is an attempt to study the growth in labour productivity, employment and wage rate in Indian Dairy industry in India. Further, the study aims to explore the impact of wage rate and employment days on labour productivity in aforesaid industry.

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The secondary data from ASI provided by MOSPI from 2011-12 to 2020-21 of 3- digit NIC 2008(Code- 105) has been taken to achieve the fore mentioned objective. Results indicated that there has been positive association between wage rate, labour productivity and employment in Indian Dairy Industry. Further, it was found that wage rate act as significant factor which determines labour productivity. However, employment was not found to be significant determinant of labour productivity. The study will be helpful for future researchers and policymakers as Dairy industry is one of the main employment generator and poverty reduction measure especially in rural India. Govt. has also been promoting/ supporting it through various schemes. It can be a better alternative for up liftment of rural people and remove disguised unemployment in agriculture sector.

Keywords: Real wage rate; employment days per employee; labour productivity; real NVA.

1. INTRODUCTION

India is the largest consumer as well as producer of milk in the world which accounts for nearly 25 per cent share in overall world's milk producers (Landes et al., 2017). Dairy industry provides food security, employment and development of rural and drought prone areas (Jaiswal et al., 2018). There is a growth of 6.6% in dairy Industry over last decade¹. Productivity and returns of labour in dairy farming are approximately 2.5 times higher than that of agriculture sector². Further, the labour productivity of dairy industry has been increasing over the years (Devi et al., 2022). Dairy farming provides sustainable income and livelihood to dairy farmers. It improved the income distribution and remove income inequalities which raised the standard of living of milk farmers (Toor and Kaur, 2022). There is growth in direct and indirect employment in dairy industry in India which contribute to GDP and hence economy. Further, the demand of milk has been increasing with increase in population. Thus, there is a need to increase productivity to bring second white revolution (Bharathy and Selvakumar, 2013). The total factor productivity in dairy industry has increased. Moreover, there is need to improve the logistics system to supply milk to processing centres to further enhance the productivity (Ohlan, 2013). Dairy industry provides subsidiary employment and income to small farmers in rural areas. However, labour productivity is one of the most powerful factors which determine the growth rate of manufacturing industries (Daharwal and Mishra, 2021). Thus, there is a need to further develop the productivity in dairy industry for development of rural areas in general and dairy farmer and

labour in particular. Labour productivity is directly associated with size and negatively associated with experience. Moreover, the growth in production has positive relation with growth in labour and energy (Kumar and Abdulla, 2021). However, Total Factor Productivity (TFP) increases with increase in technology. Thus, the present paper has been aimed to find the association between labour productivity, wages and employment. Further, the efforts have been made to find the extent by which wage and employment determine labour productivity in dairy industry.

1.1 Initiation and Development of Dairy Sector and Rural Development

India's first five year plan (1951-1956) included Indian dairy industry as one of the important sector in development plan. The priority of first five-year plan is to modernize Indian dairy industry. The goal of such inclusion was to make India self-sufficient in milk production and making available the quality milk to urban population as well (Bannerjee, 1994). Dr. Varghese kurien is known as father of white revolution who was founder of the operation flood. This operation was aimed to enhance the milk production, develop the rural economy by providing milk available at affordable prices for consumers. The white revolution started in 1970 with the implementation of National Dairy Development Board (NDDB) initiated in 1956 which was covered in three phases from 1970 to 1995 (Armentano et al., 2006). Indian dairy sector has mostly smallholder production system at village level, having one to three milking animals. Most of the production (40%) is consumed by dairy producers themselves and distribution channel is informal³. Cooperative

¹This information is retrieved from <https://www.pib.gov.in/PressReleaseDetail.aspx?PRID=1908343®=3&lang=1> dated 30-12-2024

²This information is retrieved from <https://asci-india.com/img/resources/LMIS-on-Dairy.pdf> dated 17-12-2024.

³ This information is retrieved from <https://ebooks.inflibnet.ac.in/ftp04/chapter/status-of-dairy-industry-in-india-and-its-future-scope/> dated 20-12-2024.

societies combine millions of smallholders by collecting milk at formal market. India has shown a significant growth in milk production and self-sufficiency in spite of large population increases. Indian dairy industry has high potential for growth; efforts should be made to not only increase milk production, but also to improve the formal marketing channels. Government policies should consider the comparative advantage of fluid milk.

1.2 Growth in Employment, Wages in Dairy Industry and Rural Development

Dairy industry plays a major role in rural development of India. Majority of rural population depends on agriculture which has been diversified and supplemented by dairy industry. Dairy industry provides food security, employment, income and hence enhances the standard of living of rural people. Dairy sector provides direct and indirect employment to rural people in the form of managers, workers and helpers performing cattle rearing, feeding, milking and transforming and transporting dairy products. Productivity in dairy sector is approximately 2.5 times higher than that of agriculture.⁴ Thus, it can be a better source of income and opportunities for growth of rural people. Hence, it is need of the hour to develop dairy industry by enhancing labour productivity. The factors which affect the productivity of dairy sector are wage rate, employment, adoption of new technology and proper distribution channels, interaction of experts with farmers etc. The present study is particularly focused on finding the growth of labour productivity, wage rate and employment in Indian dairy Industry and the relationship between productivity, wage rate and employment days which play key role in the development of rural areas.

Objectives of the study: This study has following specific objectives:

1. To find the growth in real wage rate, employment days per employee and labour productivity in dairy industry in India.
2. To explore the association between real wage rate, employment days per employee and labour productivity in dairy industry in India.

3. To identify the impact of wage rate and employment days on labour productivity in dairy Industry.

2. RESEARCH METHODOLOGY

The data source for present research paper is Annual Survey of Industry (ASI) provided by Ministry of Statistics and Programme Implementation (MOSPI), Govt. of India from year 2011-12 to 2020-21. The industry included in the study is 3digit NIC 2008 of code "105" representing "Manufacture of Dairy Products" which comprises processing and packaging of milk, curd, butter, ghee and cheese; ice-cream and other dairy based products.

Wages has been converted in real wages by deflating these wages with "Consumer price index for industrial workers (CPI- IW) base 2001 =100. Wage rate is determined by dividing Total Emoluments by Total Number of people engaged (Ahlawat and Renu, 2018; Kumar and Khurana, 2009).

$$\text{Wage rate} = \frac{\text{Total Emoluments}}{\text{Total Number of people engaged}}$$

Labour productivity represents deflating Net Value Added at current prices by CPI- IW base 2001=100. Labour Productivity has been calculated by dividing the real Net Value Added by Total number of people engaged (Ahlawat and Renu, 2018).

$$\text{Labour Productivity} = \frac{\text{Net Real Value Added}}{\text{Total Number of people engaged}}$$

"Man days employment per employee" provides intensity of employment viz., average days of work available to an employee. It further distinguishes between overemployment and underemployment.

$$\text{Mandays employment per employee} = \frac{\text{Total Mandays employed}}{\text{Total Number of people engaged}}$$

3. RESULTS AND DISCUSSION

Table 1 shows the growth rate of productivity, real wage rate and mandays employment per employee.

Table 1 shows that labour productivity shows negative growth in 2012-13 then slight positive growth (0.254) in 2013-14.

⁴ This information is retrieved from <https://asci-india.com/img/resources/LMIS-on-Dairy.pdf> dated 17-12-2024.

Table 1. Growth rate of productivity, real wage rate and mandays employment per employee

Year	Productivity	Real wage rate	Mandays per employee	Growth in productivity	Growth in real wage rate	Growth in mandays employment
2011-12	218.59	88.92	343.89			
2012-13	205.22	91.69	323.55	-0.061	0.031	-0.059
2013-14	257.43	115.13	339.9	0.254	0.256	0.051
2014-15	221.62	95.47	337.89	-0.139	-0.171	-0.006
2015-16	208.51	96.09	335.56	-0.059	0.006	-0.007
2016-17	219.39	93.72	334.39	0.052	-0.025	-0.003
2017-18	227.04	99.55	336.29	0.035	0.062	0.006
2018-19	198.31	98.16	333.11	-0.127	-0.014	-0.009
2019-20	169.79	87.87	329.39	-0.144	-0.105	-0.011
2020-21	167.02	93.04	327.96	-0.016	0.059	-0.004

Source: Compiled from Data taken from ASI issued by MOSPI for year 2011-12 to 2020-21.

Further, there is negative growth rate (-0.139) in 2014-15 and (-0.059) in 2015-16). However, a slight growth rate in labour productivity has been observed in 2016-17 (0.052) and 2017-18 (0.035). Thereafter, negative growth rate in labour productivity in -0.127 in 2018-19, -0.144 in 2019-20 and -0.016 in 2020-21. Similarly, growth rate of real wages is slightly increasing in 2012-13 i.e.0.031 to 0.256 in 2013-14. It shows -0.171 in 2014-15 further slight improvement of 0.006 in 2015-16, then a positive increase from -0.025 in 2016-17 to 0.062 in 2017-18. In 2018-19, growth rate was -0.014 and afterwards -0.105 in 2019-20 to 0.059 in 2020-21. Overall, productivity and wages showed fluctuating increasing and decreasing growth rate.

Table 2 indicates that there is significant correlation between growth in labour productivity and growth in wage rate at 1 % level of significance which means that labour productivity and wages are significantly associated. This result is in contrast to previous studies where growth rate in productivity was not significantly associated with growth rate in wages (Das et. al. 2017, Leung and Macdonald, 2022). Similarly, there is significant correlation between growth in labour productivity and growth in mandays employment at 5% level of significance. It means that labour productivity and mandays employment are positively associated which is similar to the results of previous studies (Kumar and Khurana, 2009).

Table 2. Inter-correlation matrix of growth in labour productivity, real wage rate and employment

	Growth productivity	Growth wage rate	Growth employment
Growth productivity	1		
Growth wage rate	0.877*	1	
Growth mandays employment	0.699**	0.532	1

Source: Computed by researchers from data issued ASI by MOSPI for year 2011-12 to 2020-21.

Note: * significant at 1 % level of significance, **significant at 5 % level of significance

Table 3. Linear regression in labour productivity, wage rate and employment

	Constant	b	t-value of b	R2	F-value	Sig. value
Wage Rate	-0.024	0.746	3.705	0.844	16.266	0.01*
Employment	-0.024	1.464	1.703	0.844	16.266	0.14

Source: Computed by researcher; Note: Significant at 1% level of significance

Table 4. Presentation of ANOVAa result

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	.108	2	.054	16.266	.004 ^b
	Residual	.020	6	.003		
	Total	.127	8			

a. Dependent Variable: Growth productivity; b. Predictors: (Constant), growth mandays per employee, Growth real wage rate

Table 5. Presentation of coefficientsa result

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-.024	.020		-1.211	.272
	Growth real wage rate	.746	.201	.705	3.705	.010
	growth mandays per employee	1.464	.860	.324	1.703	.140

a. Dependent Variable: Growth productivity

Table 3 indicates that wage rate is significant determinant (significant at 1 % level of significance) of labour productivity however employment days are not found to be significant determinant of labour productivity. Results indicate that labour productivity is enhanced through increasing wage rate and vice-versa. This result is in contrast to that of previous studies where growth in wages do not necessarily determine growth of labour productivity (Daharwal and Mishra, 2021, Pingale, & Singh, 2022). Further, it has been found that employment is not significant determinant of labour productivity which is similar to previous studies (Kumar & Khurana, 2009).

4. CONCLUSION

Indian Dairy sector have a prominent role in the world viz., India is one of the highest producers and consumers of dairy products in the world. Majority of population live in rural areas which consume almost 40% of dairy produce by themselves. The results indicate a fluctuating growth of productivity, real wage rate and mandays employment over the period of 2011-12 to 2020-21. However, the results indicated that there is positive association between productivity, real wage rate and mandays employment. Further, real wage rate was found to be significant determinant of productivity. Hence, the real wage rates should be increased to ensure improved growth of productivity and thus dairy industry. The productivity of dairy industry is two to three times higher than that of the agriculture sector. Thus, dairy industry provides food security, wages and employment in rural areas. Hence, the authorities concerned should focus on enhancing the productivity and growth of dairy industry.

DISCLAIMER (ARTIFICIAL INTELLIGENCE)

Dr. Renu and Dr. Vanita Ahlawat do hereby declare that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc) and text-to-image generators have been used during writing or editing of this manuscript.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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